$$3a^2(m-\frac{1}{m})+4ay+(x^2+y^2-4ax)(m-\frac{1}{m})=0; \text{ or}$$

$$3a^2p+4ay+(x^2+y^2-4ax)p=0\ldots(\text{II}).$$

From (II), we get $p=-\frac{4ay}{x^2+y^2-4ax+3a^2}$, and substituting this in (I), we get

$$(x^2+y^2+3a^2-4ax)^2(3a^2+10ax-x^2-y^2)-16a^2y^2(x^2+y^2-4ax)=0.$$

Also solved by M. A. Harding, S. Lefschetz, and A. H. Holmes.

367. Proposed by E. B. ESCOTT, University of Michigan, Ann Arbor, Michigan.

Solve the simultaneous equations:

$$\frac{2x}{1+x^2}=y\ldots(1);\quad \frac{2y}{1+y^2}=z\ldots(2);\quad \frac{2z}{1+z^2}=u\ldots(3);\quad \frac{2u}{1+u^2}=x\ldots(4).$$

Solution by PROFESSOR F. L. GRIFFIN, Reed College, Portland, Oregon.

By inspection three solutions are $x=y=z=u=1$, or -1, or 0; and there can be but fourteen others. Now let $x=i\tan\theta$, $[i=\sqrt{-1}]$, whence $y=i\tan 2\theta$, $z=i\tan 4\theta$, $u=i\tan 8\theta$, and $x=i\tan 16\theta$. But $\tan 16\theta=\tan\theta$ for finite values of θ only if $16\theta=\theta+n\pi$, or $\theta=n\pi/15$. Thus we have

$$\begin{array}{llllll}
x=0, & i\tan\pi/15, & i\tan 2\pi/15, & i\tan 3\pi/15, & \ldots, & i\tan 14\pi/15;\\
y=0, & i\tan 2\pi/15, & i\tan 4\pi/15, & i\tan 6\pi/15, & \ldots, & i\tan 28\pi/15;\\
z=0, & i\tan 4\pi/15, & i\tan 8\pi/15, & i\tan 12\pi/15, & \ldots, & i\tan 56\pi/15;\\
u=0, & i\tan 8\pi/15, & i\tan 16\pi/15, & \ldots & \ldots & \ldots
\end{array}$$

the values for y, z, u being of course the same sets as for x in different orders. The values $x=+1$, -1 correspond to infinite values of θ for which $\tan\theta=-i$, $+i$.

GEOMETRY.

393. Proposed by S. LEFSEHETZ, University of Nebraska.

Draw a triangle having a given angle, and with its vertices on three given concentric circles.

I. Solution by H. C. FEEMSTER, A. B., Professor of Mathematics, York College, York, Nebraska.

Let $x^2+y^2=c^2$, $x^2+y^2=b^2$, $x^2+y^2=a^2$, be the given circles, and ϕ the given angle. Place the vertex of the given angle, ϕ, on the circumference of the first circle at 0, c, the angle being formed by the lines,